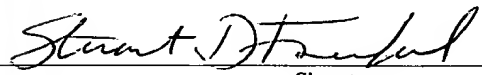

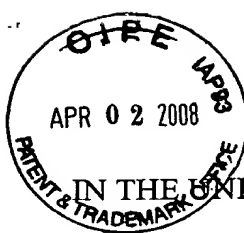
		<b>TRANSMITTAL LETTER</b> (General - Patent Pending)		Docket No. 4488	
In this Application Of: Chen, et al.					
Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/804,328	March 12, 2001	Edward M. Johnson	48226	1754	1020
Title: Selective Catalytic Reduction of N2O					
<u>COMMISSIONER FOR PATENTS:</u>					
Transmitted herewith is:  Reply to Notification of Non-Compliant Appeal Brief- 1 sheet Replacement Appeal Brief- 11 sheets					
in the above identified application.					
<input checked="" type="checkbox"/> No additional fee is required.					
<input type="checkbox"/> A check in the amount of _____ is attached.					
<input checked="" type="checkbox"/> The Director is hereby authorized to charge and credit Deposit Account No. 05-1070 as described below.					
<input type="checkbox"/> Charge the amount of _____					
<input checked="" type="checkbox"/> Credit any overpayment.					
<input checked="" type="checkbox"/> Charge any additional fee required.					
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.					
<b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b>					
 Signature			Dated: March 31, 2008		
Stuart D. Frenkel Reg. No. 29,500 Frenkel & Associates, P.C. 3975 University Drive, Suite 330 Fairfax, VA 22030 Phone: 703-246-9641 Facsimile: 703-246-9646			<div>I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on March 31, 2008 (Date)  Signature of Person Mailing Correspondence Stuart D. Frenkel Typed or Printed Name of Person Mailing Correspondence</div>		
cc:					



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Chen et al.	Art Unit: 1754
Serial No: 09/804,328	Examiner: Edward M. Johnson
Filing Date: March 12, 2001	
Title: <i>Selective Catalytic Reduction of N<sub>2</sub>O</i>	Atty. Docket No.: 4488

**Reply to Notification of Non-Compliant Appeal Brief**

Commissioner of Patents  
and Trademarks  
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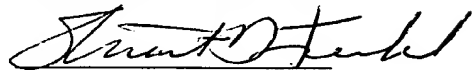
Dear Sirs,

The Examiner has indicated that the Appeal Brief filed December 13, 2007, is not compliant since the brief does not contain a correct copy of the appealed claims or any other required appendices. Accordingly, Applicant encloses herein a replacement Appeal Brief including the required appendices.

Applicant respectfully requests submission of the enclosed Appeal Brief.

3/31/2008  
Date

Respectfully submitted,

  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Chen et al.	Group Art Unit: 1754
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Commissioner of Patents  
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APPEAL BRIEF

Real Party Of Interest

The real party of interest in this case is BASF Catalysts LLC.

Related Appeals And Interferences

There are no appeals or interferences known to be related to or have a bearing on the Board's decision in the pending appeal.

Status Of Claims

Claims 3, 5-7, 10-14 and 18 are pending and have been Finally Rejected. These Finally Rejected claims form the basis of this appeal. Claims 1, 2, 4, 8, 9, 15-17, and 19-24 have been canceled.

### Status Of Amendments

No amendment or response under 37 C.F.R. 1.116 has been filed subsequent to the Final Rejection dated April 19, 2007.

### Summary Of Claimed Subject Matter

The presently claimed invention as set forth in sole independent claim 18 is directed to the selective catalytic reduction of NO<sub>x</sub> to achieve simultaneous removal of NO<sub>x</sub> and N<sub>2</sub>O from a single process stream, page 6, lines 26-29. The inventive simultaneous removal of NO<sub>x</sub> and N<sub>2</sub>O in a single process stream is achieved by introducing ammonia into the process stream upstream of a catalyst bed, page 7, lines 1-2. In accordance with this invention, the gas stream containing both NO<sub>x</sub> and N<sub>2</sub>O is passed in contact with a beta zeolite, page 7, lines 4-9. The gas stream has a temperature over 250°C, page 6, lines 1-2.

### Ground Of Rejection To Be Reviewed On Appeal

1. Claims 3, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Riley et al. (US 5,200,162) in view of Fetzer (US 6,056,928). The Examiner states that Riley discloses a process for nitrous oxide decomposition comprising contacting a nitrous oxide and NO<sub>x</sub> stream with ammonia and zeolite. The Examiner recognizes that Riley fails to disclose beta zeolite for the simultaneous reduction of the nitrogen compounds. The Examiner applies Fetzer as disclosing a beta zeolite and concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer selective for simultaneous reduction in the process of Riley. The Examiner also states that Riley discloses a temperature of reaction of 150-550 °C and discloses iron-exchanged zeolites.

2. Claims 3, 5-7, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Kato et al. (US 4,571,329) in view of Fetzer as mentioned above. The Examiner applies Kato as disclosing a process for ammonia reduction of nitrous oxide comprising contacting a nitrous oxide containing gas with ammonia and zeolite and discloses removal of NO<sub>x</sub> and N<sub>2</sub>O. The Examiner admits that Kato fails to disclose beta zeolite selective for the simultaneous reduction of the nitrogen compounds. Fetzer is applied as previously as disclosing a beta zeolite. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer in the nitrous oxide decomposition process of Kato. The Examiner states that Kato discloses a temperature of reaction of 300-500 °C and an iron-exchanged zeolite.

3. Claims 3, 10-11, and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Tsuchitani et al. (US 5,756,057) in view of Fetzer as mentioned above. The Examiner states that Tsuchitani discloses a method for removal of NO<sub>x</sub> comprising contacting a stream containing N<sub>2</sub>O with a reducing agent such as ammonia and a catalyst comprising a zeolite. The Examiner admits that Tsuchitani fails to disclose beta zeolite. Fetzer is applied as previously as disclosing a beta zeolite. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer in the nitrous oxide decomposition process of Tsuchitani et al.

#### Argument

1. ***Claims 3, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Riley et al. (US 5,200,162) in view of Fetzer (US 6,056,928).*** With respect to the rejection based on the combination of Riley in view of Fetzer, it is Appellants position that the applied references in combination do not suggest or render obvious the claimed process and in particular, do not suggest that a beta zeolite could be

effective for the simultaneous reduction of  $\text{N}_2\text{O}$  and  $\text{NO}_x$  in a gas stream further containing ammonia.

First, Riley is concerned with the decomposition of  $\text{N}_2\text{O}$  in a gas stream and not the simultaneous decomposition of  $\text{N}_2\text{O}$  and  $\text{NO}_x$ . In fact, the Abstract of Riley states that when the  $\text{N}_2\text{O}$  containing gas stream also contains  $\text{NO}_x$ , it is “often highly desirable to pretreat the stream to remove  $\text{NO}_x$  prior to the  $\text{N}_2\text{O}$ -decomposition zone.” Further, column 3, lines 45-50 of Riley states that when the gas stream contains other oxides of nitrogens such as  $\text{NO}_x$ , the process “may need to be modified to remove  $\text{NO}_x$  prior to the  $\text{N}_2\text{O}$  decomposition zone.”

In Riley, the  $\text{N}_2\text{O}$ -containing feedstock is passed into a decomposition zone containing a solid catalyst. The solid catalyst can be a variety of materials including zeolites, column 4, lines 34-39. The types of zeolites are disclosed at column 5, lines 5-24. Zeolite beta is not disclosed. In column 8, lines 25-59, Riley discloses the need to remove  $\text{NO}_x$  prior to his process of decomposing  $\text{N}_2\text{O}$ . Riley states in the mentioned passage that “the effectiveness of many catalyst for  $\text{N}_2\text{O}$  decomposition is significantly impaired by  $\text{NO}_x$ .” In the same mentioned passage, Riley states “the presence of  $\text{NO}_x$  in the  $\text{N}_2\text{O}$ -containing feed gas is detrimental. In these cases it is highly desirable to remove  $\text{NO}_x$  in a zone prior to the  $\text{N}_2\text{O}$  decomposition zone.” Riley then discloses methods which can remove the  $\text{NO}_x$  prior to the decomposition of the  $\text{N}_2\text{O}$  stream including the selective reduction of  $\text{NO}_x$  with ammonia in the presence of oxygen and catalyzed by precious metals. Clearly, Riley does not teach nor suggest the use of any catalyst which is selective for the “simultaneous reduction of  $\text{N}_2\text{O}$  and  $\text{NO}_x$ ” as claimed let alone the use of beta zeolite.

The secondary reference to Fetzer is directed to a multistage process for removing nitrogen oxides from a gas stream. Fetzer neither discloses simultaneous removal of  $\text{N}_2\text{O}$  and  $\text{NO}_x$  from a gas stream nor suggest that zeolite beta can be used to catalyze the ammonia-mediated reduction of these nitrogen oxides. Fetzer discloses a three-stage

process. In Stage A adsorption of nitrogen oxides other than  $N_2O$  is achieved such as by the use of water, column 2, lines 43-48. In Stage B, the amount of  $N_2O$  is reduced by the use of a heterogeneous catalyst. Among examples of catalysts used is zeolite beta, column 4, line 15. The zeolite catalyst may be exchanged with various metals, column 4, lines 20-21. In a preferred embodiment, a Stage C is used in which the gas stream from Stages A and B can be passed through Stage C for reducing nitrogen oxides other than  $N_2O$ . In Stage C the gas stream can be reacted by means of selective catalytic reduction (SCR) in which the nitrogen oxides are reacted with ammonia. The catalysts for the SCR reaction are set forth at column 4, lines 47-57. Zeolite beta is not disclosed for Stage C.

Accordingly, the secondary reference does not teach the simultaneous reduction of  $N_2O$  and  $NO_x$ . The secondary reference does not suggest use of zeolite beta in a reaction with ammonia. At best, Fetzer discloses in Stage B the use of beta zeolite for reducing the amount of  $N_2O$  in the absence of ammonia. Thus, it is Appellant's position that even the substitution of beta zeolite in the process of Riley does not meet the claimed process which is directed to the simultaneous reduction of  $N_2O$  and  $NO_x$ . Riley separately converts  $NO_x$  and  $N_2O$ . The patent recites that it is highly desirable to remove  $NO_x$  prior to the  $N_2O$  decomposition zone. Fetzer does not make up for this deficiency of Riley. Moreover, Fetzer does not suggest that beta zeolite can be used to reduce either  $N_2O$  or  $NO_x$  in the presence of ammonia. In fact, Fetzer uses beta zeolite without ammonia. Accordingly, the combination of Riley with Fetzer does not suggest the effective simultaneous reduction of  $N_2O$  and  $NO_x$  with ammonia using zeolite beta.

**2. Claims 3, 5-7, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Kato et al. (US 4,571,329) in view of Fetzer as mentioned above.** It is further Appellant's position that the rejection based on the combination of Kato et al. in view of Fetzer is not proper. Kato discloses in column 5, lines 18-56, the ammonia reduction of  $NO_2$  employing a reactor having filled a large amount of catalyst which is active to both the reaction of  $NO_2$  with ammonia and the ammonia reduction reaction of  $N_2O$ . The reaction takes place in the presence of a zeolite

catalyst such as an H or Fe substituted zeolite catalyst such as mordenite, zeolite Y, and the other zeolites disclosed in column 4, lines 43-49. Zeolite beta is not disclosed.

It is believed that the Examiner's reliance upon Fetzer as discussed above to disclose the use of beta zeolite for the reaction in Kato is improper. As stated above, Fetzer is not concerned with the ammonia reduction of  $N_2O$  in the presence of beta zeolite. It is the Appellants who have discovered that zeolite beta can be effectively used for the simultaneous reduction of  $NO_x$  and  $N_2O$  with ammonia. Neither Kato et al. which does not disclose zeolite beta nor Fetzer which discloses zeolite beta but not in a reaction which involves ammonia suggest or render obvious what Appellants have found.

The Board is kindly invited to Figure 8 of the present application and the discussion thereof on page 11, line 25 through page 12, line 4. The results as disclosed therein are not suggested by the combination of references.

Page 11, line 25 through page 12, line 4 discusses that the zeolite beta catalyst was unable to provide  $NO_x$  conversion in a gas containing both  $NO_x$  and  $N_2O$  without the addition of ammonia (Figure 7), but by introducing ammonia into the gas stream containing both  $NO_x$  and  $N_2O$ , conversions of both these nitrogen compounds over zeolite beta were increased substantially, Figure 8.

**3. Claims 3, 10-11, and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Tsuchitani et al. (US 5,756,057) in view of Fetzer as mentioned above.** It is believed that the rejection based on the combination of Tsuchitani et al. in view of Fetzer is improper. Appellants point out that Tsuchitani et al. is not concerned with the simultaneous reduction of  $NO_x$  and  $N_2O$ . Tsuchitani discloses a first step of oxidizing nitrogen oxides such as  $NO$ ,  $N_2O$ , etc. which are present at high proportions in the  $NO_x$  components of an exhaust gas into  $NO_2$ . The  $NO_2$  thus resulting from the oxidation step is then adsorbed on a component possessing  $NO_2$  adsorbing ability. By introducing a reducing substance such as ammonia instantaneously into the



exhaust gas enveloping the NO<sub>x</sub> accumulated on the adsorbent component, the adsorbed NO<sub>x</sub> is reduced or decomposed, column 4, lines 32-46. Thus, it is uncertain whether the gas which is treated with ammonia in Tsuchitani contains N<sub>2</sub>O since it is the purpose of the reference to initially convert NO or N<sub>2</sub>O, etc. to NO<sub>2</sub>. The only disclosure of a zeolite used in the primary reference appears to be Example 21 where ZSM-5 is utilized. However, the primary reference does not suggest simultaneous reduction of NO<sub>x</sub> and N<sub>2</sub>O with ammonia as set forth in the claims. Accordingly, even if Fetzer were combinable with the primary reference, the combination would not teach or render obvious the claimed process. Again, as stated above, Fetzer is not concerned with the use of beta zeolite to reduce N<sub>2</sub>O in the presence of ammonia. It is the Appellants who have found that zeolite beta is particularly useful for the simultaneous reduction of NO<sub>x</sub> and N<sub>2</sub>O with ammonia.

It is respectfully requested that the Final Rejection of claims 3, 5-7, 10-14, and 18 be reversed.

Date 3/31/08

Respectfully Submitted,



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## EVIDENCE APPENDIX

No evidence submitted.

RELATED PROCEEDINGS APPENDIX

Not applicable.

## CLAIMS APPENDIX

3. A method as recited in claim 18, wherein the gas stream has a temperature of from about 350°C to about 600°C.
5. A method as recited in claim 18, wherein the ammonia/N<sub>2</sub>O concentration ratio is up to about 2.0 based on the total volume of the gas stream.
6. A method as recited in claim 18, wherein the ammonia/N<sub>2</sub>O concentration ratio is at least about 0.5 based on the total volume of the gas stream.
7. A method as recited in claim 18, wherein the ammonia/N<sub>2</sub>O concentration ratio is from about 0.8 to about 1.0 based on the total volume of the gas stream.
10. A method as recited in claim 18, wherein the zeolite is ion-exchanged with at least one type of ion selected from the group consisting of Fe, Cu, Co, Ce, Pt, Rh, Pd, Ir, Mg and combinations thereof.
11. A method as recited in claim 18, wherein the zeolite is ion-exchanged with at least one type of ion selected from the group consisting of Fe, Ce, Cu, Co and combinations thereof.
12. A method as recited in claim 18, wherein the N<sub>2</sub>O concentration of the gas stream is about 1% or less.
13. A method as recited in claim 18, wherein the N<sub>2</sub>O concentration of the gas stream is about 5,000 ppm or less.
14. A method as recited in claim 18, wherein the N<sub>2</sub>O concentration of the gas stream is between about 20 ppm and about 5,000 ppm.

18. A method for ammonia-mediated  $\text{N}_2\text{O}$  and  $\text{NO}_x$  reduction, comprising contacting a gas stream containing  $\text{N}_2\text{O}$  and  $\text{NO}_x$  with ammonia and a catalyst comprising a BETA zeolite which is selective for the simultaneous reduction of  $\text{N}_2\text{O}$  and  $\text{NO}_x$ , wherein the gas stream containing ammonia, nitrous oxide and  $\text{NO}_x$  has a temperature of greater than about  $250^\circ\text{C}$ .